Some of the last chapters of this excellent work are specially rich in information and suggestiveness. That on "Will and Voluntary Movements" deals lucidly with a difficult subject; and the chapters on "Speaking, Reading, and Writing," and on "The Cerebral Relations of Speech and Thought" contain much valuable information regarding the physiology and pathology of intellectual expression and the light which they throw upon the nature of mind as a function of the brain—a phrase which must be read subject to the explanation which Dr. Bastian gives of the title of his work. There may be some reason to doubt whether transcendental metaphysicians will be prepared to admit that their belief in mind as an entity has been so completely destroyed, as Dr. Bastian thinks, by the demonstration of the doctrine of unconscious cerebration and the consequent vitiation of all deductions drawn exclusively from within the range of consciousness; but there is no room for doubt that metaphysicians of all shades must make themselves familiar with such researches as those embodied in Dr. Bastian's work. Should they fail to do so they must be prepared to find their carefully-nurtured speculations exposed to many severe rebuffs, and open at all times to that kind of merciless danger which theories experience when they run against conflicting facts.

This work is the best book of its kind. It is full, and at the same time concise; comprehensive, but confined to a readable limit; and though it deals with many subtle subjects it expounds them in a style which is admirable for its clearness and simplicity.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

Eozoic and Palæozoic

PERMIT an old worker in fossils to protest mildly against the slapdash manner in which writers sometimes hit off great palæontological questions. In your review of Roemer's valuable "Lethæa Palæozoica" it is stated that in regard to *Eozoon canadense*, he "accepts the verdict of Möbius against its organic origin, and rejects it from the list of palæozoic fossils." Now as to the acceptance of the "verdict" in question, I have nothing to say, except that the naturalist to whom are assigned the functions of judge and jury in the case very obviously lacks some of the qualifications for that high office, and has not been recognised by those best qualified to understand the case of *Eozoon*. But why Roemer or your reviewer should "reject *Eozoon* from the list of palæozoic fossils" I am at a loss to understand. As a writer on palæozoic fossils, Roemer has nothing to do with *Eozoon*. It belongs to that great series of eozoic or archæan formations which precedes the palæozoic, and which probably represents quite as long a period. Little comparatively is known of the fossils of these oldest rocks; but what we do know of their *Eozoon*, *Archæospherinæ*, *Spiral arenicolites*, and *Aspidella*, and of their immense deposits of graphitised plants, is sufficient to assure us that the life of the eozoic period was very different from that of the palæozoic; *Eozoon*, whatever its nature, is one of the most characteristic of these eozoic fossils. It has been recognised through a great vertical thickness of beds, and over so wide areas, that it is now equally characteristic of eozoic rocks in Canada and Brazil, in Bavaria and in Scandinavia. Further, it has obviously been connected with the accumulation of some of the greatest limestones of the eozoic time.

One can excuse a palæontologist familiar only with mesozoic or kainozoic fossils, when he doubts as to the organic nature of such obscure markings as *Oldhamia*, or even as to those wrinklings and scratchings on Cambrian slates which are recognised as trilobites and sponges; but we never think of asking him to accept or reject them as mesozoic fossils. In like manner those who are working out the dim traces of life remaining in the eozoic rocks will be content if geologists who scarcely condescend to recognise these great formations in their arrangements will abstain in the mean time from pronouncing judgment on eozoic remains supposed to be organic.

To us in Canada who have long regarded the eozoic formations as being quite as important in a physical point of view as the palæozoic, it is a matter of congratulation that they are now attracting so much of the attention of British geologists. Their palæontology, it is true, is still meagre, but our knowledge of it is gradually increasing, and those who have lived to see the Cambrian fauna grow from nothing to its present satisfactory condition need not despair of the Laurentian or Huronian.

Montreal, August 5 J. W. DAWSON

Algæ

I NOTICE in NATURE, vol. xxii. p. 319, that amongst other subjects you answer inquiries about minute "algæ."

I venture to send you herewith specimens of one of the Oscillatoriaceæ, which I believe is rare. In form it is nearest to what is described in the "Micrographical Dictionary" as "*Spirulina oscillaroides*" (Turp. ?), but it is very much larger. When two join and intertwine they form a cable. Under an $\frac{1}{8}$th objective it is a most striking object; it has the characteristic deep blue-green colour, and also its movements.

I shall be glad to know if it has been described by any one.

G. F. CHANTRELL

St. James's Mount, Liverpool, August 6

[The alga is *Spirulina jenneri*, Kutz, and the *Spirillum jenneri*, Hassall. It is described in the "Fresh Water Algæ" of the latter author, and the description occurs also in Rabenhorst's "Algæ aquæ-dulcis."

During this year, in a paper read by the Rev. J. E. Vize at the Montgomery Society, and printed in their *Proceedings*, it is called *Spirulina oscillarioides*, but it is larger, and more distinctly articulated than that species. The figure given by Mr. Vize is accurate. It is not very common, but we have heard of it in two or three localities during the past twelve months.—ED.]

Lightning Conductors

I SHALL feel exceedingly obliged if you will have the kindness to reply to the following question:—The painter of my villa (Villa Calpe) having taken the liberty to paint the chain of the lightning conductor attached to my house, I should like to know whether it will interfere with the efficiency of the apparatus.

CATHERINE MCPHERSON DE BREMON

Biarritz, August 5

[A coat of paint on a lightning conductor will not at all affect its efficiency. It will protect it from rust, which of course is an advantage. But if the note is to be read literally and *a chain* is used as a conductor, it is the worst possible form, and it ought to be changed for a continuous conductor. The links of a chain only touch each other at *points*, so that even a link made of half an inch in diameter of metal is reduced to the size of less than $\frac{1}{10}$ of an inch of metal. We would rather trust to a copper wire of $\frac{1}{10}$ than to *a link* of much larger size. A point of great importance is to have a good discharge in the earth, either wet soil or a large quantity of metal joined to the conductor.—ED.]

Strange Method of Crossing a Torrent

REFERRING to the inquiry of your correspondent as to the existence in modern times of the practice of carrying a stone to steady oneself whilst crossing a torrent, I may state that it is well known to the inhabitants of mountainous districts, and though practically it may not often have to be resorted to in Switzerland, where the streams are mostly well bridged, I have myself been glad to adopt it in Dauphiné. As, however, a weight on the head or shoulders would, by raising the centre of gravity, rather diminish than add to the steadiness of the bearer, it is more usual to fill the lower side pockets of the coat, and per-

haps take a large stone in each hand, and I have certainly found this useful in traversing rapid glacier streams when mid-thigh deep.

Frenchay, near Bristol, August 18 F. F. TUCKETT

Fascination

Is it a fact that snakes can fascinate birds? With reference to the fascination of man, the ingenious explanation offered in NATURE, vol. xxii. p. 338, seems to me unsatisfactory, in that it supposes the individual fascinated to be self-conscious in a degree necessary for the consideration which of two courses to adopt to escape danger. This supposition implies an amount of self-consciousness which surely is absent in such cases as narrated? I have frequently experienced this fascination when standing on the railway platform as the engine was steaming in, and with myself at those times it was to be accounted for by the *absorption of attention by the external object, little being left for self.* That cries for assistance showed consciousness of danger, as in cases mentioned by Mr. Curran in NATURE, vol. xxii. p. 318, might be explained by the fact that these would follow on a much less attention to self than would be required for movement to carry the body out of danger. Indeed they would be the outcome of *feeling* rather than of *thought*. This view seems to be borne out by the very description of those fascinated, *e.g.*, "have had their senses so engaged by a shell in its descent," "whose every gyration in the air he could count" (NATURE, vol. xxii. p. 318), and it is expressed definitely by Mr. Spencer ("Principles of Psychology," vol. ii. p. 438) :—

"When the external object or act is an astounding one, the observer partially loses consciousness of himself. He is, as we say, *lost* in wonder, or has *forgotten* himself; and we describe him as afterwards *returning* to himself, *recollecting* himself. In this state, the related impressions received from the external object, joined with representations of the objective changes about to follow, monopolise consciousness, and keep out all those feelings and ideas which constitute self consciousness. Hence what is called 'fascination;' and hence the stupefaction on witnessing a tremendous catastrophe. Persons so 'possessed' are sometimes killed from the inability to recover self-consciousness in time to avoid danger." RICHARD HODGSON

Cambridge, August 17

"Hyper-Space"

IF some one learned in many dimensions would throw some light on *rudimentary contour lines in hyper-space*, it would doubtless interest many readers of NATURE, and inconceivably yours, $\sqrt{-1}$

August 9

THE BRITISH ASSOCIATION

THE fiftieth Annual Meeting of the British Association was opened yesterday evening at Swansea, when Prof. Allman resigned the presidential chair to Prof. Ramsay, who gave his inaugural address.

At midday on Monday the reception rooms at the Agricultural Hall, St. Helen's Road, were formally opened for the transaction of the business of the Association, under the direction of Mr. Gordon, the permanent under-secretary of the general staff, and the local honorary secretaries, Dr. Wm. Morgan and Mr. James Strick, and their efficient local staff. The hall, our Swansea correspondent informs us, is admirably situated on the borderline that separates the business part of the town from the west end residential suburbs, and the conveniences of the place are augmented by a good line of tramway and a temporary cab-stand in front, and telegraph, telephone, and post-office within the building. The arrangements had been brought to a very creditable state of completion by Monday, and the visitors have been pouring into the town steadily since Saturday. The suburban watering-place of Oystermouth, or The Mumbles, and many others of the favourite summer resorts of Gower are full to overflowing, but in the more immediate outskirts of the town, on the gently-sloping hill-sides that offer such excellent fresh air and such extended prospects of landscape and sea-view, there is ample accommodation for all comers, thanks to the really warm local hospitality and to the careful arrangements of the Local Committee.

A fair number of papers are down for reading in the various sections, the usually popular section of geography, however, exhibiting a sad dearth of contributions; we trust things may look brighter here before the end of the meeting.

INAUGURAL ADDRESS OF ANDREW CROMBIE RAMSAY, LL.D., F.R.S., V.P.G.S., DIRECTOR-GENERAL OF THE GEOLOGICAL SURVEY OF THE UNITED KINGDOM, AND OF THE MUSEUM OF PRACTICAL GEOLOGY, PRESIDENT

On the Recurrence of Certain Phenomena in Geological Time

IN this address I propose to consider the recurrence of the same kind of incidents throughout all geological time, as exhibited in the various formations and groups of formations that now form the known parts of the external crust of the earth. This kind of investigation has for many years forced itself on my attention, and the method I adopt has not heretofore been attempted in all its branches. In older times, Hutton and Playfair, in a broad and general manner, clearly pointed the way to the doctrine of uniformity of action and results, throughout all known geological epochs down to the present day; but after a time, like the prophets of old, they obtained but slight attention, and were almost forgotten, and the wilder cosmical theories of Werner more generally ruled the opinions of the geologists of the time. Later still, Lyell followed in the steps of Playfair, with all the advantages that the discoveries of William Smith afforded, and aided by the labours of that band of distinguished geologists, Sedgwick, Buckland, Mantell, De la Beche, Murchison, and others, all of whom some of us knew. Notwithstanding this new light, even now there still lingers the relics of the belief (which some of these geologists also maintained), that the physical phenomena which produced the older strata were not only different in kind, but also in degree from those which now rule the external world. Oceans, the waters of which attained a high temperature, attended the formation of the *primitive* crystalline rocks. Volcanic eruptions, with which those of modern times are comparatively insignificant, the sudden upheaval of great mountain chains, the far more rapid decomposition and degradation of rocks, and, as a consequence, the more rapid deposition of strata formed from their waste—all these were assumed as certainties, and still linger in some parts of the world among living geologists of deservedly high reputation. The chief object of this address is, therefore, to attempt to show, that whatever may have been the state of the world long before geological history began, as now written in the rocks, all known formations are comparatively so recent in geological time, that there is no reason to believe that they were produced under physical circumstances differing either in kind or degree from those with which we are now more or less familiar.

It is unnecessary for my present purpose to enter into details connected with the recurrence of marine formations, since all geologists know that the greater part of the stratified rocks were deposited in the sea, as proved by the molluscs and other fossils which they contain, and the order of their deposition and the occasional stratigraphical breaks in succession are also familiar subjects. What I have partly to deal with now, are exceptions to true marine stratified formations, and after some other important questions have been considered, I shall proceed to discuss the origin of various non-marine deposits from nearly the earliest known time down to what by comparison may almost be termed the present day.

Metamorphism.—All, or nearly all, stratified formations have been in a sense metamorphosed, since, excepting certain limestones, the fact of loose incoherent sediments having been by pressure and other agencies turned into solid rocks constitutes a kind of metamorphism. This, however, is only a first step toward the kind of metamorphism the frequent recurrence of which in geological time I have now to insist upon, and which implies that consolidated strata have undergone subsequent changes of a kind much more remarkable.

Common stratified rocks chiefly consist of marls, shales, slates, sandstones, conglomerates, and limestones, generally distinct and definite; but not infrequently a stratum, or strata, may partake of the characters in varied proportions of two or more of the above-named species. It is from such strata that meta-